Pure Copper

TROJAN
Discover the Truth of Material

Purpose:

Observe the microstructure of pure copper. The pure copper sample undergoes cutting (CT-250S), mounting (FLEX-PRESS automatic modular hot mounting machine), grinding and polishing (Alpha-610), and surface treatment inspection under a microscope (MN80). The sample is then etched using ferric chloride and hydrochloric acid aqueous solution to observe its microstructure.

Recommended parameters for different specimen size				
Sample size/ diameter (mm)	25	30	40	50
Individual force loading mode, individual sample pressure force (N)	-5	0	+(5~10)	+(5~10)

*Standard pressure: ϕ30mm (adjust according to sample size).

Recommended Equipment and Consumables (select grinding/ polishing consumables based on sample conditions):



CT-250S Manual Cutting Machine

Cutting

Equipment	CT-250S Manual Cutting Machine	
Cutting wheel	S20 Silicon Carbide Cutting wheel	Order No: 01.02.450
Cutting coolant	TJ 1410 Metallographic Cutting coolant	Order No: 01.07.857
Fixture	Fast lock vise	
Cutting method	Vertical cutting (Chopping cutting)	
Cutting parameters	Feed rate	Manual operation
	Cutting wheel speed	2800rpm

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FlexPRESS Automated Modular Hot Mounting Machine

Hot Mounting

Equipment	FlexPRESS Automated Modular Hot Mounting Machine
Mounting Resin	PT 2231 Hot Mounting Resin　　Order No：02.01.310
Heating Power	100%
Holding time	4min
Temperature	160℃
Pressure	150bar
Cooling Conditions	Cool to 30℃
Cooling rate	High
Top heating	Enabled

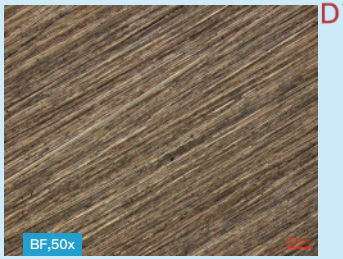
Basic Guide

- **Cutting** 1.Pure copper hardness is approximately 100HV. Select an S20 silicon carbide grinding wheel cutting blade. Refer to the Trojan Cutting Guide for specific model selection.
- **Mounting** Use universal hot mounting resin (PT-2231) for mounting process.
- **Grinding** 1.Use P400 SiC sandpaper/grinding disc for rough grinding until the sample surface is flat and the cutting damage layer is fully removed.
  2. After rough grinding, use a POS disc with 9μm diamond polishing suspension for further grinding.
  3.Clean the sample and fixture with water after each grinding step.
- **Polishing** 1.Before polishing, clean the polishing cloth, fixture, and hands. Repeat cleaning after each polishing step.
  2.Do not mix polishing discs with different abrasive particle sizes.
  3.Rinse the sample surface with alcohol and dry it with a blower to remove residual water.
  4.After each polishing step, inspect the scratch patterns under a metallographic microscope to ensure their size matches the polishing grit and direction is randomized.
  5.If scratches remain after YS polishing, extend polishing time by 3—5 minutes.
  6.Clean used polishing cloths with running water and a soft brush, then store them after draining.

Preparation Procedure——Pure Copper

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1	P400	Water	25N	50/300rpm	Until plane
2	*POS disc	9μm MD-WT Monocrystalline Diamond polishing suspension	25N	50/150rpm	5min
3	YS-JP	3μm PD-WT Polycrystalline diamond polishing suspension	20N	50/150rpm	5min
4	*ZN-ZP	50nm T401 Silica polishing suspension	20N	50/150rpm	1min(Wash the sample for the last 15 seconds)



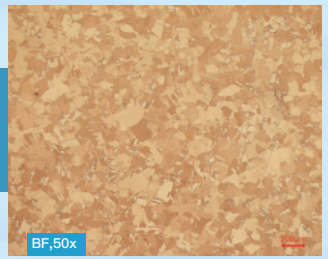


*POS disks can also use P800 、P1200 and P1500 SiC abrasive paper for replacement.





*Note: For silica polishing fluid, add ammonia and hydrogen peroxide (ratio: 1mL $NH_3 \cdot H_2O$ + 1mL H_2O_2 + 48mL SiO_2 suspension).

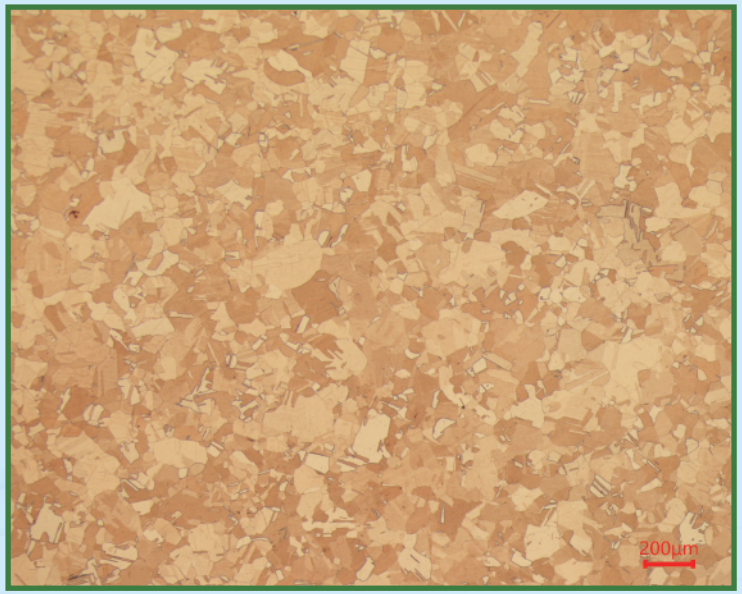


Etch with ferric chloride hydrochloric acid aqueous solution
(Ratio: 5g $FeCl_3$+10mL HCl + 100mL H_2O) for 10—20 seconds

Pure Copper-Polishing Defect Sample

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Photos of qualified polished samples



- Clear microstructure with a clean,scratch-free surface.

Photos of unqualified polished samples



- Residual scratches or unclean surface; ammonia and hydrogen peroxide not added to polishing fluid;
- Solution: Repolish and re-etch. If the etching layer is too deep, regrind and repolish.